THE INFLUENCE OF ROUTINE INTERDEPENDENCE AND SKILLFUL ACCOMPLISHMENT ON THE COORDINATION OF STANDARDIZING AND CUSTOMIZING

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Keywords: standardization, flexibility, interdependence, skillful accomplishment, professional service routines, reinsurance, practice, ethnography

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Acknowledgements: We are grateful to our funders for their support; Economic and Social Research Council (grant RES-173-27-0163), British Academy of Management (grant SG091192) and the Insurance Intellectual Capital Initiative. We thank Luciana D'Adderio, associate editor, and the three anonymous reviewers for their insightful guidance. We would also like to thank Wanda Orlikowski; Brad MacKay, Donald MacKenzie and colleagues at Edinburgh University; Ann Langley, Linda Rouleau and colleagues at HEC Montreal; Martha Feldman, Nina Bandelj and colleagues at the Center for Organizational Research, University of California, Irvine; Beth Bechky, Gino Cattani, Natalia Levina and colleagues at New York University; and participants in the Process Research in Organization Studies (PROS) workshop 2014 for their comments on earlier drafts.

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ABSTRACT

This paper advances understanding of the coordination of interdependence between multiple intersecting routines and its influence on the balancing of coexisting ostensive patterns. Building on a professional service routine – the deal appraisal routine – and its intersections with four related routines, we develop a dynamic framework that explains the coordination of standardization and flexibility in four ways. First, intersecting routines have shifting salience in the performance of a focal routine, and this shifting salience is enacted through professional skill and judgment. Second, each intersection amplifies pressure towards one or the other ostensive pattern thus introducing dynamism into the balancing of competing ostensive patterns. Third, professionals skillfully acknowledge these pressures from intersecting routines to orient towards one ostensive pattern and then reorient the performance of the routine towards the opposite ostensive pattern. Fourth, this balancing act, which we theorize as reciprocal task interdependence, occurs within the moment of performing each task, so providing a highly dynamic understanding of the association between routine interdependence and the coordination of coexisting ostensive patterns.

INTRODUCTION

This study addresses a critical puzzle in routine theory; the implications of interdependent routines in coordinating the relationship between standardization and flexibility (Adler et al. 1999; D'Adderio 2014; Cohen 2007; Cyert & March 1963; Feldman & Pentland 2003, 2008; Nelson & Winter 1982; Turner & Rindova 2012). It does so within the context of professional services routines. Professional services span private and public sector organizations and include medical, consulting, legal, engineering, and financial trading routines (Empson, Muzio & Broschak, 2015). Professional services are particularly pertinent contexts in which to study the relationship between standardization and flexibility in routine theory because: "Professional services involve a high degree of customization in their work. Little, even management information, can be reliably made routine" (Maister 1993: 1). Professional service contexts thus address calls for studies of routines "where variability and change appear to dominate" (Turner & Rindova, 2012:44). Yet such routines also have to be delivered in a standardized way in order to ensure accountability and reliability (Abbot 1981; Maister 1993), particularly in the face of increasing regulatory

scrutiny (Arnold, 2005). The ability to balance high degrees of both standardization and flexibility is thus critical within professional service routines.

We aim to examine the role of interdependent routines in the balancing of standardization and flexibility. Professional routines are typically required to coordinate a number of different interdependencies in the tailoring and delivery of services (Larsson & Bowen, 1989; Lowendahl, Revang & Fosstenlokken, 2001). For example, the performance of knee surgery relies on the coordination of a series of related routines such as the diagnostic routine, anesthetic routine, theatre preparation routine, and so forth. During the surgical routine, the surgeon draws on professional knowledge to continuously assess what has been done and what still needs to be performed, which might involve ongoing coordination with other routines, such as the anesthesia routine. The performance of such professional routines is thus interdependent with and needs to coordinate a series of connections with related routines (Hilligloss & Cohen, 2011), each of which may make different demands on flexibility and standardization. We suggest that these interdependencies may illuminate the specific mechanisms and activities through which competing demands for standardization and flexibility are balanced.

Our study draws on an ethnographic study of the *deal appraisal routine* in the context of United States (U.S.) property catastrophe reinsurance[1]. Reinsurance is a financial services industry that takes risks on large-scale catastrophes, such as tsunamis, earthquakes, floods and droughts. Specifically, reinsurance provides insurance for insurance companies, in the form of financial deals that cover the risk of potential loss from such major catastrophes. There is immense variety in such deals in terms of their geographic location (e.g. Florida or San Francisco), the type of catastrophe (e.g. bushfire or hurricane), the property portfolios (e.g. mobile homes, condominiums) and many other distinctive factors. Each deal is therefore tailored specifically to the requirements of an insurer. Yet at the same time, this is a highly routinized form of work, as underwriters appraise up to 400 deals a year. Hence, the deal appraisal routine incorporates both high levels of flexibility to account for variation in deals, and also follows a standardized pattern of actions that enable underwriting professionals to perform consistently and efficiently in the face of a high volume of customized work. Furthermore, these deals are interdependent with a set of intersecting routines, such as the broking, client meeting, modeling and business planning

[1] Our empirical context is the appraisal of property catastrophe deals originating in the United States. These deals are the dominant class of global business, comprising the largest amount of reinsured premium, and offer the highest degree of standardization in the reinsurance industry, thus providing a salient context for our study.

routines. Each intersect is critical to ensure a standardized yet customized appraisal, and may be enacted multiple times. The reinsurance deal appraisal routine is thus a salient context for examining the interdependencies involved in standardization and flexibility in professional routines.

Building from our findings, we develop a conceptual framework that theorizes the role of routine interdependence and skillful accomplishment in coordinating the coexisting ostensive patterns in four ways. First, intersecting routines have shifting salience in the performance of a focal routine, and this shifting salience is enacted through professional skill and judgment. Second, each intersection amplifies pressure towards one or the other ostensive pattern. Third, professionals skillfully acknowledge these pressures from intersecting routines to orient towards one ostensive pattern and then reorient the performance of the routine towards the opposite ostensive pattern. Fourth, this balancing act occurs within the moment of performing each task, so providing a highly dynamic understanding of the association between routine interdependence and the coordination of coexisting ostensive patterns. This framework comprises the basis for our discussion and contributions.

THEORETICAL FRAMING

This theoretical framing is in two parts, first examining the coexistence of ostensive patterns for standardization and flexibility within routine theory, and then how it may implicate routine interdependence between them.

Ostensive Patterns for Standardization and Flexibility – and their Coexistence

Competing pressures for standardization and flexibility are a core tension at the heart of routine theory (Adler et al. 1999; D'Adderio 2014; Cohen 2007; Cyert & March 1963; Feldman & Pentland 2003, 2008; Nelson & Winter 1982; Turner & Rindova 2012). While standardization ensures task and process consistency and enhances efficiency through repetition and/or automation (Becker 2004; Stene 1940), flexibility hinges on variation from internal or external circumstances. Although conceptualized as competing pressures, both are critical for performance. Standardization drives efficiency while flexibility avoids complacency and inertia (Cyert & March 1963; Nelson & Winter 1982).

Early routine theorists explored this tension as one of sequential attention: Organizational rules prioritize one goal *at a time* to avoid goal conflicts. Attention to each goal shifts sequentially as environmental demands change, for instance from exploration (flexibility) to exploitation (standardization), and require different sets of rules and procedures. Sequential attention thus

conceptualizes standardization and flexibility as separate, prioritizing *either* one *or* the other (e.g., Nelson & Winter 1982; Tushman & Romanelli 1985). Separation is supported by artifactual representations, such as standard operating procedures, rules, or checklists (e.g. Cohen et al. 1996; Nelson & Winter 1982). They embed prescriptive, declarative knowledge (Cohen & Bacdayan 1994), which reduces the need for decision-making, suppresses flexibility, and supports the standardization of tasks and processes (Adler et al. 1999; Nelson & Winter 1982; Lazaric & Denis 2005).

However, such strict sequential separation of competing pressures has been challenged in recent years (D'Adderio 2014; Turner & Rindova 2012). Early on, Adler and colleagues (1999) demonstrated how Toyota simultaneously achieved *both* standardization *and* flexibility by compartmentalizing distinct routines and bringing them together in meta-routines. Increasingly, therefore, a performative view has emerged. From a performative view, the capacity for flexibility or change and their standardizing characteristics are equally important in routines (e.g. D'Adderio 2011; Feldman 2000; Feldman & Pentland 2003). They are not black-boxed entities that change in response to exogenous shocks (Cohen et al., 1996; Nelson & Winter 1982). Rather, they are 'effortful accomplishments' (Pentland & Rueter 1994, 486) that may generate change (Dittrich, Guerard & Seidl, forthcoming; Pentland, Feldman, Becker & Liu 2012; Zbaracki & Bergen 2010). The performative view conceptualizes routines as instantiated within mutually constitutive ostensive and performative aspects (Feldman & Pentland 2003). The ostensive aspect is the "abstract, generalized idea of the routine", or its pattern, while the performative consists of "specific actions, by specific people, in specific places and times" which bring that pattern into being (Feldman & Pentland 2003: 101). Without continuous performances enacting the ostensive aspect over time, any routine degenerates to an abstract concept (Feldman 2015).

Studies adopting the performative view cast the relationship between standardization and flexibility as dynamically coexisting ostensive patterns; one oriented towards standardization, the other oriented towards flexibility (e.g. D'Adderio 2014; Howard-Grenville 2005; Turner & Rindova 2012; Zbaracki & Bergen 2010). For example, Turner and Rindova (2012), in their study of garbage collection routines, show that the standardization pattern dominates. Nonetheless, they also find an ostensive pattern oriented towards flexibility which facilitates consistency at times of disruption, for instance during road closures. Both coexisting ostensive patterns are brought into being through the performances of crew and customers as they face the particular standard or altered conditions for garbage collection. D'Adderio

(2014) takes this notion of coexistence further. Theorizing from a server transfer from the U.S. to the U.K., she shows that both ostensive patterns may be enacted simultaneously, yet their dominance shifts from standardization during the routine transfer period to flexibility in the post transfer period. The initial dominance of standardization enables replication during the transfer, while the dominance of flexibility in the post transfer period allows the server to adjust to the new circumstances in the U.K. Based on these findings, D'Adderio (2014) shows how actors selectively perform both alignment and improvement to balance competing pressures to adhere to standards and adjust to new circumstances; actors "first selectively performed one goal and then the other. Through materially mediated performances, they energized one goal (which was made more prominent) while backgrounding the other (which was not, however, entirely suppressed as in sequential attention)" (D'Adderio 2014, 22). Selective performance thus provides a dynamic understanding of the continuously unfolding relationship between standardization and flexibility.

This performative view also reconceptualizes artifactual representations (D'Adderio 2008, 2011, 2014; Feldman & Pentland 2008; Leonardi 2011) in ways that go beyond earlier views of standard operating procedures that *either* determine *or* hardly impact routine performances (e.g. Nelson & Winter 1982; Tales & Hidd 2009). Now, artifacts embed abstract representations of patterns of action. For example workflow models inherently inscribe, yet do not determine, the pattern of the workflow to be performed (D'Adderio 2003, 2004, 2008, 2014; Howard-Grenville, 2005; Leonardi 2011). Such artifactual representations guide patterns of action (Feldman & Pentland 2008), but actors may bypass their rules to perform tasks in a novel way (e.g. Orlikowski 2002), or adapt their rules to capture newly emerged adapted performances (D'Adderio 2003, 2004; 2008; 2014; Leonardi 2011). Artifactual representations may thus be at the heart of balancing standardization and flexibility as coexisting ostensive patterns (D'Adderio 2014; Turner & Rindova 2012). For example, Turner and Rindova (2012) show that different artifacts were designed to either support the standardized pattern or provide guidelines for performing a flexible pattern during road closures. Such variation in design ensured the simultaneous enactment of standardized and flexible patterns. D'Adderio (2014) advances the performative view by demonstrating how artifactual representations can evolve to support changing relationships between standardization and flexibility. In her study, artifacts that oriented routine performances towards standardizing during the transfer period were adapted to orient performances towards improvement and change during the post-

transfer period. Such adaptation enabled artifacts to support the shifting emphasis between enactments of coexisting patterns.

The above studies have increasingly drawn out the coexistence and, importantly, the simultaneous enactment of standardization and flexibility. In doing so, they implicitly note the potential complementarity of such coexisting ostensive patterns and provide explanations, such as selective performance, how such complementarity may be realized. Nonetheless, to provide further insights into the dynamics of reducing conflict and enabling complementarity between coexisting ostensive patterns Turner and Rindova (2012: 44) call for research "in contexts where variability and change appear to dominate". We suggest that professional service routines provide exactly such a context. They involve complex tasks with a high degree of task and process variation (Maister, 1993), yet also face increasingly stringent pressures for accountability and standardization (Bowen & Jones 1986; Larsson & Bowen 1989; Sharma 1997).

Routine Interdependence and Coordination

The issue of how multiple ostensive patterns coexist in ways that enable their complementarity and negate their potential conflict raises questions about how such coexistence is coordinated. We therefore now turn to issues of routine interdependence and coordination (Jarzabkowski, Le & Feldman, 2012). Any routine is "enmeshed in far-reaching, complex, tangled webs of interdependence" that are "not limited to the immediate actions of the participants" (Feldman & Pentland, 2003: 104). Such interdependence with adjacent or overlapping routines may explain flexibility within routine performance. For example, in her study of hiring and training routines Feldman (2000) shows that interdependence is integral to the generative nature of routines. Specifically, adjustments in the handovers between elements of the routines reconfigured the nature and order of tasks in the routines. When the hiring routine was adapted to produce uniform staff looking after university halls of residence, the training routine was adapted to develop specialized skills to attend to students' specific needs. Routine interdependence may thus enable complementarity between standardized and flexible performances of a routine's ostensive patterns. However, interdependence might also surface conflict when different groups have different understandings of a routine's ostensive aspect (Zbaracki & Bergen, 2010). For instance, major price changes surfaced different understandings about the ostensive pattern of a price adjustment routine between the marketing and sales division. Here, it was necessary to violate the ostensive understandings

of both divisions in order to resolve the inherent conflict in the price adjustment routine (Zbaracki & Bergen, 2010). Clearly, routine interdependence - and its role in minimizing conflict and enabling complementarity between standardization and flexibility - is a critical, yet under-explored issue.

Concepts such as 'connections' (e.g. Feldman 2000, Feldman & Rafaeli 2002; Zbaracki & Bergen, 2010) 'routine ecologies', (e.g. Birnholtz et al. 2007, Turner & Rindova 2012) and 'embeddedness' (e.g. D'Adderio 2014; Howard-Grenville 2005) have furthered our understanding of how interdependent routines coordinate the relationship between multiple coexisting ostensive patterns. Connections and interactions with actors outside the specific performances of a focal routine can motivate more flexible performances (see also Feldman 2003; Feldman & Rafaeli 2002), such as the needs of customers, which prompted garbage collectors' flexible performances to deliver consistent outcomes despite disruptions to the routine (e.g. Turner & Rindova, 2012). By contrast, studies of embeddedness investigate how the strength of a routine's overlap with other structures constrains the flexibility of its performance and mediates the potential for change in the overall pattern (Howard-Grenville 2005). Yet such embeddedness is also mediated by actors' intentions and their orientations towards past, present or future performances of the routine. Taken together, these findings suggest that we think of any focal routine as situated within a routine ecology that generates coherence amidst multiple intersecting routines (Birnholtz et al. 2007). In such ecologies, prior experiences contribute to the coordination of "typically inconsistent capabilities and preferences of its members into a coherent ecology of recurring actions" (Birnholtz et al. 2007: 316). While embeddedness and routine ecologies may predispose stability in the performance of any particular routine, an alternative, more dynamic view is that routines are enacted through, rather than embedded in, context, which therefore "may contribute to dynamically constituting and reconstituting routines" (D'Adderio, 2014: 1347). For example, in her server transfer study communities' dominant orientation towards alignment contextually predisposed standardization, but in the post-transfer context, these communities oriented towards improvement, so instigating flexibility. These findings suggest that any study of how ostensive patterns for standardization and flexibility are coordinated, must consider the context of interdependent routines within which the focal routine is performed and how this context is enacted (Howard-Grenville 2005; Turner & Rindova 2012).

Further, such studies should also consider how artifacts both enable and constrain the coordination of routine interdependence (e.g. Bechky 2003; Carlile 2002; Leonardi, 2011). Some studies

highlight the way occupation-specific artifacts (Cacciatori 2012), such as product specifications constrain the coordination of interdependent actions across occupations (e.g. Bechky, 2003). However, others show the facilitative role of occupation-specific artifacts as these make differences in knowledge accessible to other occupations, enabling actors to subsequently integrate and transcend occupation-specific knowledge (e.g. Majchrzak, More & Faraj, 2012; Kellogg et al., 2006). While artifacts appear to be critical in coordinating routine interdependence because of the knowledge they inscribe, we need to understand more about how knowledge that arises from, and is inscribed in, the artifacts associated with intersecting routines is enacted within a focal routine (D'Adderio 2001, 2003, 2004; Leonardi, 2011).

Based on the above literature review, this paper examines the research question; *how is routine interdependence implicated in coordinating competing demands for standardization and flexibility in the context of professional service routines*? Professional service routines provide a salient context because they face high demands for *customization*, but also require *standardization* to ensure consistency, accountability, and efficiency, especially in high volume work (Abbott 1991; Maister 1993).

METHOD

Research setting

Our empirical setting is a professional service routine, the deal appraisal routine (DAR) in the reinsurance industry. Reinsurance is, effectively, the insurance of insurance companies. Insurers purchase reinsurance to cover very large pay-outs to policyholders in the event of a catastrophe, such as an earthquake, hurricane, or flood, damaging many properties simultaneously (Jarzabkowski, Bednarek & Spee, 2015). Our study focuses on underwriters, the reinsurance professionals who perform the DAR on property catastrophe reinsurance deals covering commercial and residential properties in the U.S. The DAR is a very common routine. It constitutes the core of everyday work for these underwriters, who typically appraise some 400 deals a year and select 15-20% of them to place their firm's finite capital. While the DAR is a common and standardized routine across the profession, each specific deal is very different and requires a high degree of customization (Jarzabkowski, Bednarek & Spee, forthcoming). Hence this is a salient context to examine the simultaneous enactment of coexisting demands for standardization and flexibility.

The DAR is an industry-wide routine that is performed in a consistent pattern by all U.S. property underwriters (Dupont-Courtade 2013). Yet the parameters of each deal vary enormously creating pressure

to customize each appraisal (see Table 1). For example, deals may vary from protecting a portfolio of residential properties in Florida from hurricane damage, to crops in the mid-West from tornadoes, to commercial properties in California against bushfires and/or earthquake. The specifics of each deal create even greater variation. For example, deals vary on their range of properties from mobile homes to condominiums to high-value homes containing fine art, each with different structural properties, different degrees of resilience to particular types of disaster, and located within different proximities to that potential disaster. The local environment also varies. For example, a wooded area can escalate damage from high wind, while mitigating features, such as installing hurricane shutters, can minimize damage from the local environment. Additionally, the deal varies from year-to-year, according to past losses or changes in the portfolio.

The specific combination of these multifarious variations makes each deal unique and its appraisal complex and highly tailored. Further, in order to select those 15-20% of deals on which to place their finite capital, underwriters must consider each deal against others and against their firm's appetite for U.S. property deals, both of which also vary significantly from year-to-year. In performing the DAR, underwriters thus need to exercise significant professional judgment in combining a range of qualitative and quantitative insights into the deal, the client, their portfolio and broader market trends. Hence, underwriters have a high degree of *autonomy* to use their professional *judgment* to *customize* their deal appraisals; the three characteristics that define professional services (e.g. Maister 1993).

INSERT TABLE 1 ABOUT HERE

At the same time, given the volume of work and their personal risk management role, underwriters are pressured to ensure consistency, accountability and efficiency through standardization (Empson 2001; Greenwood, Hinings & Brown 1990). In the DAR, consistency is supported by standardized inputs, such as identical submission brochures for all parties interested in a specific deal and some common industry tools (Borscheid, Gugerli & Straumann 2013), including consistent statistical models and a rating sheet which supports the various tasks of the deal appraisal. As the DAR carries significant risks for their company, underwriters are required to leave an audit trail that holds them accountable for their decisions (Abbott 1981; Jones, Hesterly, Fladmoe-Lindquist & Borgatti 1998). The routinized nature of the DAR and its common artifacts, such as the rating sheet, support its standardized performance.

Yet, at the same time underwriters' customized decision-making requires flexibility. Therefore, the DAR is not 'explicitly stored' (Cohen 2007: 775) in written rules or standard operating procedures. Instead, underwriters have a professional understanding of the task sequence (Pentland & Feldman 2008: 241) that enables them to draw on the knowledge arising from interdependent routines performed with brokers, clients and modelers, appraise a specific deal, and generate a market rate at which they are willing to trade it.

The DAR is thus a professional service routine comprised of *two ostensive patterns*; one oriented towards *retaining flexibility* to customize each specific deal appraisal; and the other oriented towards *achieving consistency* to breed accountability and efficiency across customized performances.

Data collection

We collected data from multiple sources (Silverman 2001), including non-participant observations, interviews and documents, to closely examine the pattern of actions involved in performing the DAR. The research team had in-depth access to eleven firms operating in London and/or Bermuda and spent mornings, afternoons and evenings with underwriters as they renewed reinsurance deals over an annual cycle. Three researchers were in the field for a collective total of 280 days. They observed the everyday office interactions of 86 people in these eleven reinsurance firms, including underwriters, their immediate managers and their underwriting assistants.

Informed and sensitized by our wider immersion in the field (Guba & Lincoln 1985), we have isolated a data set that only includes data pertaining to those 24 underwriters involved in U.S. property catastrophe deals for this paper (see Jarzabkowski, Bednarek & Cabantous, 2015). These underwriters perform a particular reinsurance trading routine that is highly consistent and comparable. We produced extensive notes for 159 separate ethnographic observations, each from one to four hours in length, of U.S. property specific work. These observational notes were typed up within 24 hours. Each observation was also audio-recorded, allowing us to use time markers in our field notes to listen to any specific segments of the recordings during further analysis. We focused on deal appraisal work, but also observed related work, including client meetings, interactions with brokers and modelers, and business planning; data which all informed our subsequent identification of the DAR and its intersecting routines.

We also conducted and transcribed audio-recorded interviews with each of these underwriters, as well as with brokers, modelers and senior executives, embedding the DAR routine in its broader context.

Interviews typically took one hour and were conversational, encouraging participants to articulate what they did and what aspects of practice were important when appraising a reinsurance deal. We also collected documentary data, such as deal submission packs, rating sheets and graphs used during deal appraisals, which provide further insights into the actual materials involved in this routine. Multiple data sources enabled us to triangulate and enhance data trustworthiness (Guba & Lincoln 1985).

Coding and analysis

As is typical of rich qualitative research, analysis went through several phases (see Langley 1999; Strauss & Corbin 1998). In the ethnographic study of routines, "action itself provides an observable, meaningful basis on which to proceed" (Pentland et al. 2012: 1487). We therefore began analysis in the field, noting and discussing the various actions we observed as underwriters appraised deals, and using participants' own terms as *in vivo* codes or developing descriptive labels. We then ordered these activities sequentially into a flow chart of the sequence of actions that we observed and that participants themselves identified as typical (see Table 2). This substantiated our conceptualization of deal appraisal as a routine. Subsequently, to flesh out this flow chart, one author wrote a thick description of a typical DAR and circulated it to the other authors, each of whom further enriched the narrative with illustrations and quotes from the field (see Jarzabkowski, Bednarek & Le 2014). This narrative was then discussed and refined with recourse to the data until all authors were satisfied that it provided a comprehensive, accurate and thick description of the DAR, which comprises the basis for our first-order findings.

Drawing from this thick description, but also the raw data, we identified three empirical phases that we gave descriptive labels from the field: 1) technical analysis, including: "*all those models and, you know, looking at their data is giving you probably a kind of technical price level*" (Interview); 2) weighted technical analysis, which involves loading factors onto the technical rate from phase one in order to develop a weighted technical rate: "*usually what we do has been loaded, because of the potential growth and, I mean, various factors*" (Interview); and 3) a market analysis culminating in the market rate on which a decision can be made; "*the technical versus market price, that is an interesting one because actually it's … they are very, very different and ultimately it's always a commercial decision*" (Interview). We explain these three phases in the first-order findings.

Next, we coded and clustered underwriters' activities to understand how they manage the simultaneous pressures to customize their appraisal to the wide variety and combination of parameters that make each deal complex and unique, but also create a comparable numerical value for said unique

deal. Across the 24 underwriters, we noted that some activities were consistent and helped convert each deal into a recognizable output. We thus termed them *standardizing performances*. For instance, every underwriter received a submission pack and created a technical rate, weighted technical rate and market rate. Other activities, however, varied more as underwriters tailored their appraisal to accommodate the specific parameters of each deal. We therefore termed these *customizing performances*. For instance, underwriters tailored their appraisal to the particular peril and properties by blending statistical modeling tools differently, or loading similar deals differently based on their judgment of the client's growth projections. We also uncovered numerous instances in which underwriters *re-performed a previous task* (see boxed rows in Table 2); for instance a recent loss or a data update would trigger a selective re-performance of prior modeling. These instances showed that standardizing performances and customizing performances are both 'mindful activities' (Pentland & Rueter 1994; Levinthal & Rerup 2006) that an underwriter skillfully selects when and how to perform (D'Adderio 2014).

Against this backdrop, the rating sheet, an excel sheet with some specific macros and structures embedded, struck us as a routine-specific *core artifact*. Its consistent appearance throughout all steps of the DAR shows that it is integral to the routine, supporting both standardizing and customizing performances. Informed by previous studies of the influence of artifactual representations on routine performances (e.g. D'Adderio 2011, 2014; Howard-Grenville 2005; Pentland & Feldman 2005, 2008; Turner & Rindova 2012), we noted that the rating sheet is a structured template that supports the tasks performed in the routine. For each deal appraisal, an underwriter opens a new rating sheet that he/she then amends in each phase of the routine. A few embedded macros perform simple calculations and ensure that manual data entries are consistently captured in all places required. Data entry itself, the specification of calculation parameters and their initiation, however, remains the underwriter's responsibility and discretion. For example, he uses his judgment to blend modeled outputs, instruct the macro to run the blend and incorporate it into the rating sheet as the Technical Rate. While the underwriter can re-perform any task, rerun these macros, and adjust the recorded values in the rating sheet, they never alter these embedded macros. Thus, the rating sheet remains a stable template from deal-to-deal, shaping the sequence of actions to be performed, but neither performing any actions itself nor prescribing what actions should be taken (see D'Adderio 2011).

We also noted that in their standardizing and customizing performances throughout the DAR, underwriters were dependent on knowledge arising from other routines. We thus conceptualized the DAR as the 'focal routine', interdependent with four 'intersecting routines': the broking routine, the modeling routine, the client meeting routine and the business planning routine, which are explained briefly in Appendix A.

Next, we systematically coded those specific points at which interdependent routines intersect with the focal routine (see Table 2). We identified regular intersections that were clearly necessary to perform particular next steps. These, we termed *mandatory* intersects. Yet, other intersections occurred in an ad hoc, often iterative fashion at the discretion of underwriters. We termed these *discretionary* intersections (see Table 3). Both types of intersections were typically associated with specific artifacts that carry knowledge from intersecting routines into some element of the focal routine, such as the client notes which are produced during the client meeting routine and critically inform both the technical and the weighted technical analysis in the DAR. We termed these *supplementary artifacts* (see Appendix A).

We then explored the influence of intersecting routines on the DAR. We noted that intersects *amplified pressures* towards one ostensive pattern or the other; that is, they provided insights emphasizing the need to either achieve consistency or to retain flexibility. The specific insight from the intersecting routine thus provided an impulse, *orienting* the underwriter towards either standardizing or customizing performances. However, in exploring the specific intersections, we noted that underwriters do acknowledge an orientation, for example, acting upon the standardizing impulse from the modeling routine (see Table 3), but also *reorient* their performance towards the opposite ostensive pattern, for instance by customizing how the modeled outputs reflected the specificities of this deal. The attention to the specific orientation of an intersecting routine, and its corresponding reorientation struck us as the core of underwriters' professional skill. The interplay of orienting and reorienting allows them to balance customizing and standardizing performances within each task. Indeed, underwriters enacted the particular *salience* of any intersecting routine according to its ability to inform either customizing or standardizing performances at each stage in the DAR.

Building from recent studies on the performance of coexisting, competing ostensive patterns (e.g. D'Adderio 2014; Turner & Rindova 2012), we identified our routine as comprising the dynamic balancing of customizing and standardizing performances - instantaneously within each task. This balancing act of

customizing and standardizing was triggered by the interplay of orienting and reorienting, making the interdependence of standardizing and customizing reciprocal. Drawing from Thompson's (1967) distinction between sequential interdependence (sequential attention to different tasks generates interdependence across time) and reciprocal interdependence (interdependence is generated through intense and reciprocal interaction between units or tasks), we therefore identified this dynamic balancing as reciprocal task interdependence. We explain this concept in the second order findings, before discussing how routine interdependence, as it is performed within specific tasks within professional service routines, helps to coordinate competing demands for standardizing and customizing.

FINDINGS

Section one of the findings presents a composite narrative of the deal appraisal routine (DAR) through which underwriters develop the market rate at which they are willing to trade a specific deal. As explained above, this composite narrative presents the full breadth and depth of our ethnographic data on the everyday performance of the DAR, including its various intersecting routines and their interdependences, within a single evocative story (Van Maanen, 2011). The narrative reflects the thick description of the DAR that we identified as typical across all U.S. property underwriters, firms and time periods during our 280 days in the field. All examples are taken directly from our observational fieldnotes, and all quotes are verbatim from our fieldnotes and audio recordings.

First-Order Analysis: Accomplishing the Deal Appraisal Routine

In this narrative, John, an underwriter at reinsurance firm ReCo appraises a specific Louisiana windstorm deal from insurance firm, InsureCo. John draws on a range of intersecting routines, highlighted in bold, square brackets, and their associated artifacts, underlined, to tailor the DAR to the specifics of this InsureCo deal. Yet, through his continuous balancing of specific customizing and standardizing performances, he also follows a process that is consistent with professional practice. In order to illustrate the vast variation in deal specifics, Table 2 provides further representative examples of customizing and standardizing performances, which we reference as additional evidence throughout the following narrative.

INSERT TABLE 2 ABOUT HERE

Performing technical analysis

John is sitting in an open plan office, his desk dominated by his keyboard, two computer screens and various papers, when he receives an email from a broker, Ted, with the submission pack for the InsureCo deal **[intersection of broking routine and DAR]**. This submission starts John's DAR. He quickly scans the cover email (Table 2, Row B). He moves his cursor over the screen, briefly hovering over the *'key facts'* and *'year-on-year changes'* (Vb. Fn.)[2] to check any changes from last year that would ring alarm bells or give him a steer on how to customize his approach to this deal. Nodding approvingly he explains: *'[Ted] has put all the main information about changes […] in the email, in a very clear and structured way'.* (Obs. Vb.). That, John concludes, makes life easier, helping him to spot key prompts for customization, but also filter noise from the submission and facilitate consistent data entry.

John then opens the pdf submission brochure, a detailed narrative on the deal, on his right screen and an Excel rating sheet on his left. Embedded in this rating sheet are some macros he can run to generate standard outputs his colleagues and market peers will recognize, such as a technical rate, a weighted technical rate, and a market rate. He copies the deal's key parameters from the submission brochure into the rating sheet and runs one of these macros to '*pull through all of the previous year's information into the sheet ready for comparison*' (Vb. Fn.). This step of '*repopulating the spreadsheet'* (Table 2, Row C) is important for standardizing the information on the deal. It enables him to capture information consistently for year-to-year comparisons and start a transparent audit trail of his customized appraisal. He then *'flicks between the information screens in the submission brochure, and entries in his rating sheet*' (Vb. Fn.) immersing himself more deeply in the submission brochure. He '*has a look at one sheet in particular within the submission which illustrates [InsureCo's] exposures'* (Vb. Fn.). The sheet breaks down InsureCo's insured values by property type (residential versus commercial) and by regions within Louisiana. He then scrolls to another sheet with fine-grained information on the number of insured properties by zip code, their insured values, and their changes over the past four years. Turning to the next exhibit, John traces the frequency and severity of InsureCo's losses over the past 10 years, jotting down a few notes.

These notes form the basis for his instructions to Emily, his modeler **[intersection of modeling routine and DAR]** because '*a lot of the process is in the interaction between the underwriter and the analyst'* (Int). For John, it is critical to translate his initial reading of the submission brochure into clear modeling

[2] Italicised sections in quotation marks are direct extracts from our field notes. Verbatim quotes from our observations are labelled as 'Vb. Obs.' and verbatim reproductions of our own field notes as 'Vb. Fn.'.

instructions about how Emily should run the two main industry models, AIR and RMS (Table 2, Row D). Each model generates several thousand scenarios to compute the probability and likely magnitude of a loss on any deal. While the models are standardized, each has different statistical assumptions and relative strengths for particular perils and regions. Tailoring their parameters to the specifics of the InsureCo deal is therefore in John's professional judgment and responsibility. The more John can communicate his judgement to Emily, the better she can customize her analysis. He therefore emails her his notes as a bullet-point list of instructions with a hyperlink to the modelable raw data from Ted's email. As John hits the 'send' button, he returns to the rating sheet to capture the thinking behind his instructions in the section for *'underwriter notes'*. He explains '*you got to do these straight-away. If I get hit by a bus tomorrow, someone else must be able to pick up from the data and my notes ... You wait, you look at ten other deals, it gets quite tricky to retrace your steps' (Vb. Obs.).* John's work on this deal is now done until Emily returns the modeled outputs. He therefore picks up one of the several deal appraisals he is always working on in parallel, switching between them as he receives the relevant information to update and perform analysis.

Two days later an email from Emily, with her comments and two separate Excel spreadsheets containing the modeled outputs from AIR and RMS respectively, re-starts John's InsureCo DAR **[intersection of modeling routine and DAR]**. John quickly scans Emily's comments, explaining that this constant customizing is at the heart of the professional ethos: *'[If] somebody's just looking at a modeled output and it's saying something should be whatever the price might be, that's only half the story' (Int.)* (Table 2, Row F). To make his customizing consistent and traceable – for himself and others – he uses the rating sheet. Bringing up the InsureCo rating sheet on the left screen, he imports the AIR and RMS modeled outputs into a linked worksheet in the rating sheet to produce a standardized, numerical view of the deal (Table 2, Row G).

John then digs out a client meeting file labeled 'InsureCo' (Table 2, Row H) [**intersection with client meeting routine**]. This contains the hand-written personal notes he made during their last client meeting as well as the maps, photos, and presentation handouts he took away, such as InsureCo's strategic plan. John leafs through the file to find a map of the state of Louisiana. The map is color-coded for different geographic regions and their proximity to historic hurricane paths. At the meeting, InsureCo managers presented plans to shift exposure away from coastal zones, which, the map shows, are more exposed to hurricanes. He mumbles to himself as his fingers trace the color-coded zones on the map:

'[tracing the green zone*] 1% wind and hail deductibles, [*tracing purple*] 2% wind and hail deductibles, [*tracing yellow and orange*] all this business that they write has got no wind or hail…, [*tracing red*] looks like they managed to get off that most exposed zone all together except a few policies* (Vb. Obs.). In tracing these outlines, John is refreshing his knowledge of the specific parameters of this deal, including the type of commercial and residential property InsureCo insures in each zone. He explains that statistical modeling is not enough; to perform a truly customized appraisal and do the client justice, he needs to apply his professional judgment to this additional information: '*I don't want the black and white information, I want the story!*' (Vb. Obs.).

With the map in front of him, John brings up Ted's submission brochure and scrolls to the page outlining InsureCo's shifting exposure over the past years **[intersection with broking routine]**. He traces the rows of a table; comparing InsureCo's current insured values in Louisiana's highly exposed areas to 2005 when they were hit by hurricanes Rita and Katrina. Noting the reduction of insured values in some coastal zones over the past years, John exclaims: '*That's really good!*' (Vb. Obs.). Using his own client meeting file and Ted's submission brochure, he has checked this reduction in exposure, which he can use to customize the modeled outputs. With the location of InsureCo's insured values clarified, John investigates other aspects of the deal:

> *'John turns from the rating sheet on his first computer screen to the second where the submission brochure is open. He scrolls to the information about "Louisiana's marketplace" and looks at the section on "trading" which indicates their guidelines. He continues reading, looking at the section on "data" and the "exposure map" [only 15 seconds], then "the construction type profile" by year [*when it was built*] and wall type'* (Vb. Fn.).

Iterating between submission brochure and rating sheet, John turns his attention to the 'structure' of InsureCo's deal which, as is typical, is structured in 'layers'; specific monetary bands that capture the insured values. While a deal's structure comprised of layers is standard, the number and range of layers and the lowest and highest value of bands are entirely deal-specific. Working out how much capital ReCo might place on each layer of the deal, is thus a highly tailored process in which underwriters evaluate each layer both individually and in the context of the entire deal. InsureCo's deal is structured into three layers. Layer 1 is at the lowest threshold, triggering if losses exceed $20 million. It therefore carries the greatest risk of a payout, and so needs to return the highest premium for ReCo. Less risky layers 2 and 3 will offer

lower rates of return. Therefore, to establish the relative return on investment for ReCo, John needs to analyze the deal's specific exposure, return, and price on each layer.

John needs to decide how to blend the respective outputs of the AIR and RMS models, because '*it is not set in stone what the weightings are in the model*' (Vb. Obs.). In his view, one has strengths in modeling commercial property, the other in residential property. To tailor his rates to the composition of InsureCo's portfolio, John decides to give more weight to the RMS outputs for the first two layers and to AIR for the top. He enters these customized weighting factors into the linked sheet, and runs the macros in the rating sheet to calculate the blended outputs for each layer. The re-calculated blended rates instantly appear in a column headed '*technical rate'* (Table 2, Row J). Examining them closely, he recounts that sometimes the technical rate '*won't look right*' (Vb. Obs.), meaning it contradicts his professional judgment and prompts him to request more information from the broker or give Emily new modeling instructions so she can re-run the modeled outputs. John concludes by nodding approvingly at this technical rate. Running his cursor across the relevant cells, he then double-checks that the standard modeled outputs and his customized weighting factors have been recorded accurately in the rating sheet. When he is satisfied that everything is in order, he types his personal notes into the rating sheet to explain how and why he blended the modeled outputs in this way. As he finishes his notes he explains that articulating a clear rationale for the way he has customized the standardized technical rate is critical in case a colleague needs to take over his deal or use it as a benchmark for their own appraisal of another deal. With 400 deals a year, many of them being appraised simultaneously, John points out it is difficult to remember precisely what he decided on InsureCo over a week, let alone from year-to-year. Any inconsistencies due to incomplete notes lead to patchy audit trails that undermine an underwriter's professional credibility in front of peers, management and especially clients. Indeed, he has to justify all his appraisal decisions to his peers during ReCo's weekly risk review. Given the number of deals they have to get through every week, he wants to be sure he can clearly explain each of his customizing steps in a consistent way that is reassuring to his colleagues.

Performing weighted technical analysis

John stretches as he gazes at the technical rate in his rating sheet. While it is an important milestone; '*you have to take a pinch of salt on it. If the modeled rate is losing money, then the model is obviously not capturing the underlying risk very well*' (Vb. Obs.). Hence, he will generate a '*weighted technical rate'* (Table 2,

Row, K), which incorporates specific *'secondary modifiers'* that reflect contextual characteristics of the deal, his personal knowledge of the client, and ReCo's *'loadings'* (Vb. Obs.) for overheads and profit margins: *'You'll be using a broad brush of things that you'll be looking at. So you'll be looking at historical losses, you'll be looking at the modeled information and […] you'll be loading that data up for your profit and margin and the rest of it' (Int.).* He explains that the application of these deal-specific loadings (Table 2, Row, L) is where the rating sheet is really useful for tailoring the deal because underwriters '*can enter the technical prices derived from AIR or RMS models, then do all their own assumptions and pricing on top of that'* (Vb. Fn.). To generate a weighted technical rate that reflects his personal knowledge of this deal, John first establishes its past losses. He will use these to load the technical rate for different layers to generate some 'payback' for the claims ReCo has paid. Each deal, each year, has a distinct loss profile that the DAR must account for. Hence, there is no standard way to do this weighting. Instead, it results from a combination of actual figures and underwriter interpretation of the extent to which those figures should influence the price. John '*flicks through the submission brochure to find loss information which he reads more intensely. He mulls, pulling faces and pressing his lips together as he reads the information'* (Vb. Fn.) [**intersection with broking routine]**. The submission brochure lists a wind loss from a recent hurricane that ReCo covered for InsureCo. Hence, in the rating sheet John adds a load factor to all three layers to generate payback. Specifically, he enters a load factor into a template cell for each layer in his rating sheet, next to the weighting factors he entered in his previous step. That way, he can separate the impact of different customizing steps and simply run the loadings on the technical rate he had already generated so that the new figures for each layer appear in the 'weighted technical rate' column.

John checks the new figures and something seems amiss. He frowns, reaches for his client meeting file again, and flips through its contents **[intersection with client meeting routine].** Suddenly he pulls out a photo of a flooded supermarket. Looking at the photo, he mutters to himself: '*water was halfway up the side of the building… It's just a lake. It's a total flooding*'. He shows the photo to the researcher, pointing out: '*the supermarket sign on the roof [*which is a stand-up billboard on top of the roof*] has not got one letter damaged*' (Vb. Obs.). He recalls that they discussed this particular loss at the client meeting with InsureCo because it was quite expensive and also contested in court. That was why John kept the photo. Reminded by the photo, John recounts the full tale, explaining that InsureCo had taken their policyholder to court in an attempt to show that this was flood damage, not wind damage from the recent hurricane as he claimed.

Wind damage was excluded from his policy and InsureCo should not have to pay out. This is significant for John, because, if the loss was caused by windstorm, then the rooftop billboard should be damaged. Given the water level, the damage appears to be caused by flooding after the windstorm, which ReCo does not cover for InsureCo. However, despite the evidence in the photo, '*the court ruled it as a wind loss'* (Vb. Obs.) which their policy covered and InsureCo had to pay. Still shaking his head, John explains that InsureCo has good policies and gives them credit for fighting the case in court. He seems satisfied that the payout, which was passed on to ReCo, was not InsureCo's fault.

Having refreshed his knowledge through the client meeting file, John decides that his initial loadings, based on information from the submission brochure alone, may have been overly harsh. John can now tailor them to more specific issues; for example, he feels that the weighted technical rate on Layer 3 is too high for a good client who keeps good control of his claims. He decides to re-run the figures with a reduced loading on the technical rate on Layer 3. Given InsureCo's plans to reduce exposure in high-risk areas, he also decides to reduce his loadings on Layer 1, while Layer 2 appears reasonable as it is. He adjusts his initial loadings in the rating sheet, which are instantly translated into a new weighted technical rate for each layer (Table 2, Row N). As John looks at the new figures, he feels that they better account for InsureCo's situation, reflecting those subtleties and idiosyncrasies that models cannot capture. As a quick sense-check, he asks Charles, a fellow U.S. property underwriter who is walking by, *'to deliver a reality check that it is all correct – if the figures stack up to what he'd expect to be the differences in the layers'* (Vb. Obs.). John is pleased when Charles scans the notes he entered into the rating sheet and agrees with his reasoning. As he finalizes these notes, he explains: '*We call this justification by contextualization'* (Int.).

Performing market analysis

The weighted technical rate is not the actual price John will charge for this deal: *'You're obviously trying to get the best price you can for your capacity. So there will be an element of market pricing in there as well'* (Int.). He now needs to complete the DAR by generating a '*market rate'* that he will quote to the market (Table 2, Row O). This incorporates ReCo's capital charges for deals of this nature, based on its business plan and John's knowledge about price fluctuations in the market. The market rate is the price at which John will be willing to trade the InsureCo deal, and will complete the DAR.

Reinsurance firms have to manage their portfolio to avoid having too many deals concentrated in any particular region, where a single catastrophe could blow their capital base. Hence, ReCo's annual business planning routine produces a capital allocation plan that assigns specific capital targets to each geographical area and type of peril, such as windstorm **[intersection with business planning routine]**. Every underwriter is then individually responsible to *'always compare any decision to your exposure in that region and also to your overall portfolio'* (Vb. Fn.). As the capital allocation is dynamic, always depending on how much capital has already been allocated to other deals in that region, each underwriter must tailor each deal appraisal to the relative capital scarcity for deals of that type at that particular moment in time (Table 2, Row P). John thus examines how much InsureCo's deal will add to ReCo's existing exposure in Louisiana. He looks on ReCo's capacity checker which monitors how many deals they currently have offers on in the market, meaning how much capital they have promised. As he brings that function up on screen, Charles returns and *'they're talking through how up to date the capacity checker is, to know where they're up to. They talk about which deals are in as they scroll through the various cells on the capacity checker and Charles reminds John that their Chief Underwriting Officer recently reported that they are "slightly ahead of business plan"'* (Vb. Fn.). That means, ReCo has no need to reduce rates on deals such as InsureCo at this point, as they are on target to hit their planned capital allocation. By contrast, if he had still been a long way off his target, John might have tweaked the figures in the rating sheet to lower his rate, increase demand, and spend more of his capital.

In the final step, John wants to ensure that his pricing is internally consistent and externally competitive (Table 2, Row Q). To do so, he now uses the rating sheet to generate a graph with each of the three layers plotted on a curve relating the amount of premium to the exposure on each layer. Over the past week, John has already evaluated ten deals for Louisiana. As part of their DAR he created a rating sheet, similar to that for InsureCo, for each of them. Each sheet has been converted into a graph and John brings all of them up on screen; ten different colored comparative curves, each representing a specific deal [**intersection with parallel DARs for other deals**]. He then imports the curve representing the InsureCo deal that, despite its unique features, has now been standardized to be compared to other deals for the purposes of capital decisions. He looks at them for a few minutes, comparing the eleven curves of reinsurance deals in Louisiana, then mumbles: '*this one comes out on top of A* [InsureCo's competitor A], *but below B* [InsureCo's competitor B], *but I like the bottom layer of C too* [InsureCo's

competitor C]' (Vb. Obs.). John decides that he will make an offer on InsureCo as well as these other 3 deals, but discard the others. However, to be consistent, he will marginally lift the rate on Layers 1 and 2, because he thinks InsureCo needs to pay a bit more to align with the other deals. He returns to his rating sheet, instructing its encoded macros to apply an increase of 0.2 to the weighted technical rate of Layer 1 and of 0.5 to Layer 2, while he leaves the weighted technical rate on Layer 3 unchanged. As he does so, the rating sheet generates his final figures on each layer in the *'market rate'* column for this deal.

John has now completed this DAR and is ready to offer the market rate as the price at which he will be willing to reinsure InsureCo (Table 2, Row, R). He prepares an email to Ted, offering his market rate on the deal, which legally commits his firm's capital if the offer is accepted. Once he hits send on the email [**intersection with the broking routine**], he adds another line of notes to the rating sheet, explaining the market rate that he generated. These notes will be helpful for him, or indeed for another underwriter, when it comes to looking at this deal next year. He will also make these completion notes in the rating sheet of all the other deals he has analyzed in Louisiana to generate the above comparative curves, explaining which ones he made offers on, and why he chose not to offer on others. He has thus tailored the DAR to the unique characteristics of each deal, even as he has been able to standardize the stages and outputs of each deal in ways that provide accountability to his peers, consistency on any individual deal from year-to-year, and consistency across all the deals he has analyzed.

Second-Order Findings: Routine interdependence in coordinating coexisting ostensive patterns

Building on these first order findings, which are representative of the DAR routine, we now briefly introduce four insights into the association between interdependent routines and their implications for coordinating coexisting ostensive patterns of standardization and flexibility. We draw them together in Table 3 and then explain each with reference to Table 2 and the first order findings.

First, the simultaneous enactment of coexisting ostensive patterns is coordinated by intersecting routines, each of which amplifies pressure towards one or the other ostensive pattern. Hence, any intersecting routine, at the point of intersection, provides an impulse that orients the performance of the focal routine towards either customizing or standardizing.

Second, the intersection with these interdependent routines may be either discretionary or mandatory. This means the underwriter can exercise his professional judgment and choose to draw on an

interdependent routine, or he must respond to a handover from another routine. The underwriter's professional skill lies in rendering the particular intersection salient to the specific task and stage in the DAR.

Third, in order to continuously balance the competing ostensive patterns of the routine, underwriters pay attention to impulses from intersecting routines, but then counteract their amplified pressure by reorienting their performances within the DAR.

Fourth, as intersecting routines do not neatly alternate between impulses triggering customizing and standardizing performances, underwriters cannot rely on a sequential interdependence from one intersection to the next to balance competing ostensive patterns over the course of the entire focal routine. Instead, it is incumbent upon the underwriter to *continuously* reorient in order to re-balance each task within the focal routine in response to each impulse from each intersecting routine, which we label reciprocal task interdependence.

INSERT TABLE 3 ABOUT HERE

Intersecting routines amplify pressures towards competing ostensive patterns. Professional service providers thrive on their ability to customize solutions to each client's specific demands (Empson 2001; Greenwood, Hinings & Brown 1990). This is particularly true in reinsurance, where deal specifics vary immensely and tailored appraisals are the bedrock of long-term client relationships. At the same time, deal appraisals must culminate in a recognizable, standardized output that can be traded in a financial marketplace. Hence, the deal appraisal routine – as a professional routine - is dependent upon coexisting ostensive patterns for flexibility and standardization. Intersecting routines provide important resources for enacting both patterns. Specifically, our data showed that at the point of intersection interdependent routines either *amplified* pressure to achieve consistency or *amplified* pressure to retain flexibility (see 1st order findings and Table 2).

Each intersection, by amplifying pressure towards either ostensive pattern, provides an impulse that orients an underwriter towards a specific corresponding performance in the DAR. For example, the intersection of the modeling routine with the DAR (see Table 3) amplifies pressure for consistency and orients the underwriter towards standardizing the rich information of the deal into consistent and comparable modeled outputs. By contrast, as we saw with John, the initial intersection of the broking routine, or the multiple intersections with the client meeting routine amplify pressure for flexibility by

showing the rich and varied information to be taken into account. This provided an impulse that oriented John towards customizing the deal. The underwriter's orientation in response to these impulses is supported by supplementary artifacts that inscribe the knowledge arising from the intersecting routine such as the modeling output (modeling routine), the submission brochure and cover email (broking routine), or the client notes (client meeting routine).

These impulses on the focal routine are situated, depending upon the particular context of the tasks, rather than being a generic characteristic of the intersecting routine. For example, the same intersecting routine may amplify different pressures at different stages within the focal routine, as shown in the first order findings. While the initial intersection with the broking routine amplified pressure to retain flexibility in appraising the InsureCo deal, the intersection at the end of the DAR amplified pressures for consistency, to provide a quote that was comparable across deals (see Table 3). Hence, the underwriter's professional skill in enacting the intersection of interdependent routines at particular points in the DAR is critical to how these intersections constitute particular pressures towards one or the other ostensive pattern.

Intersection with interdependent routines may be mandatory or discretionary. Pressures from interdependent routines only become salient as and when they intersect with the focal routine. Some of these are mandatory intersections to which the underwriter must respond, as, for example, John's response to the initial intersection with the broking routine, which marked the start of the DAR, or the final intersection to complete the DAR by submitting his quote to the broker. Such mandatory intersections involve professional skill and judgment to the extent that an underwriter must recognize and enact the salience of either standardizing or customizing impulses arising from the intersection (see Table 3). While some intersections – such as the broking, modeling or business planning routine – are mandatory and typically enacted at a specific moment in the sequence of tasks, other intersections are discretionary. An underwriter may enact them ad hoc and at any point during the DAR, such as the client meeting routine (see Table 3). As shown in John's frequent iterations with the client meeting routine, the underwriter chooses to enact these intersections purely according to his professional skills and judgment about their salience to the task at hand. Such professional skill extends to the capacity to re-visit, or even re-perform, any intersection (see boxed rows in Table 2), regardless of whether it was initially mandatory or discretionary. For example, an underwriter may require analysts to re-run the modeling routine,

potentially to reflect new data from the client which made the previous modeling obsolete, or, as we saw with John, may enact discretionary intersections with the broking routine in order to generate richer information about, or re-perform, some aspect of the focal routine. Importantly, therefore, it is not the mandatory or discretionary nature of the intersection that determines whether it amplifies pressures towards consistency or flexibility, but the underwriter's professional skill in enacting the salience of these pressures at particular moments in the focal routine.

Coordinating coexisting patterns: Reorienting impulses from intersecting routines. Intersections with interdependent routines amplify pressures towards coexisting ostensive patterns aimed at either achieving consistency or retaining flexibility. These pressures provide an impulse orienting the underwriter towards either standardizing or customizing performances, respectively. The underwriter acknowledges and works with this impulse to incorporate the salient information from the intersection, which thus provides a resource supporting the performance of that ostensive pattern. However, as shown in Table 3, the underwriter then reorients his performance to counter-act the initial impulse and re-balance coexisting ostensive patterns within the focal routine. For example, at the intersection with the modeling routine, John acknowledged its impulse to standardize by reducing the rich data to comparable modeled outputs. However, he also *reoriented* this impulse towards a customizing performance by exercising his professional judgment on what assumptions to make in running the model in his instructions to his analyst, Emily. Upon receipt of the modeled outputs, with their inherent impulse to standardize, he acknowledged and then reoriented the impulse by customizing the specific weightings of each modeled output according to his professional judgment of the application of each model to the different layers of this specific deal. The rating sheet supports the balancing of these orienting and reorienting performances. It captures the various performances within a standardized format, gives room to customize the information incorporated into the standardized format, and, in the notes section, to provide a consistent audit trail of the rationale for each customization.

Reorienting requires professional skill and expertise to recognize the impulse of an intersecting routine on the DAR *and* counter-balance it with a performance that enacts the alternative ostensive pattern. The interplay of orienting impulses from intersecting routines and their reorienting through an underwriter's skilled performance is at the heart of the dynamic coordination of coexisting ostensive patterns. Both the impulses from intersecting routines, which bring salient information into the focal

routine, and their reorientation to counterbalance the pressures that these intersections constitute, are critical to coordinate the performance of these coexisting patterns.

Coordinating in the moment: reciprocal task interdependence. Intersecting routines do not neatly alternate between impulses for customizing and standardizing performances. Rather, as shown by John (see also Table 3), underwriters may exercise their discretion to enact a series of intersections all oriented towards one ostensive pattern. John's iterations with the client meeting and broking routines to establish an appropriate weighted technical rate all orient him towards customizing. The coordination of coexisting ostensive patterns through orienting and reorienting performances is thus *not* a series of sequential tasks; first attending to the impulse from one intersection and then attending to its alternative at the next intersection. Rather, the continuous coordination of orientation and reorientation is a professional skill that occurs within the specific moment of attending to and rebalancing the impulse from one particular intersection. Drawing on Thompson (1967) we refer to this professional skill in acting upon and reorienting each intersecting impulse as reciprocal task interdependence. As the core artifact in the DAR, the rating sheet contributes to the coordination of reciprocal task interdependence. It supports the shifting salience of interdependent routines and competing demands from ostensive patterns and ensures consistency as it disciplines underwriters to record every major decision. Despite their autonomy when to make an intersecting routine salient, underwriters' actions are always 'on record', holding them accountable to peers, management, and even external auditors. Reciprocal task interdependence as it plays out in the moment by moment balancing of competing ostensive patterns enables the application of professional judgment and skill in customizing, whilst also ensuring that such customizations comply with demands for professional consistency and accountability.

DISCUSSION

This paper set out to examine how routine interdependence is implicated in coordinating competing demands for standardization and flexibility in the context of professional service routines. We now draw our findings together into a conceptual framework that explains how coexisting ostensive patterns in a focal routine are dynamically balanced through its interaction with interdependent routines, as coordinated by skilled professional actors (see Figure 1). This framework provides the basis for our contributions to the understanding of routine interdependence and the simultaneous coordination of coexisting ostensive patterns (D'Adderio 2014; Feldman & Pentland 2008; Turner & Rindova 2012).

Our study showed that the interdependence between a focal routine and a number of intersecting routines is critical in balancing the two ostensive patterns for ensuring consistency and retaining flexibility. Specifically, each intersecting routine *amplifies pressure* towards one or the other ostensive pattern (see Figure 1). Such amplification injects an impulse into the focal routine that *orients* the actor towards performances that enact the respective ostensive patterns. As the professional service routine requires both standardization and flexibility simultaneously, these intersecting routines - through the particular knowledge they inject into the focal routine - provide resources that underpin the persistence of each ostensive pattern. These come in the shape of supplementary artifacts, such as the modeled output, or the broking submission pack, which inscribe knowledge that arises from the intersecting routine and is pertinent to a specific ostensive pattern within the focal routine. We therefore argue that the interdependence of focal routine and intersecting routines - each of which amplifies pressure towards one or the other ostensive and orients professionals towards corresponding performances - is critical for enabling the persistence and coexistence of each ostensive pattern.

INSERT FIGURE 1 ABOUT HERE

On their own, however, these intersections cannot balance competing ostensive patterns. As our findings suggest, two features are central to the balancing act. First, pressures from intersecting routines are neither constant nor sequential. Interdependent routines only amplify pressure and provide an impulse to the focal routine at the moment of intersection, and their salience varies according to particular tasks in the focal routine (see Figure 1). While we found that some intersections are mandatory, others are discretionary, enacted according to the professional's judgment that some additional knowledge from an intersecting routine is required to complete a task. These discretionary enactments of intersections mean that there is no sequential order of impulses towards standardization and flexibility within which the overarching balance of the two is coordinated across the routine process. Rather, there is professional skill in deciding what kind of impulse is salient at what stage in the process, and enacting that salience by drawing upon knowledge inscribed in one or more of the interdependent routines available.

This enacted salience emphasizes the second key point in the balancing act. While an intersecting routine orients the actor towards one set of performances, that actor then reorients towards the alternative performance to accomplish balance within the specific task (see Figure 1). Such reorientations,

while involving significant professional judgment, were always logged within the rating sheet to provide a focus for, and record of, the continuous balancing of competing demands as it played out in the tasks being performed. These skilled performances at the point of intersection with interdependent routines were thus central in balancing the tendency towards one ostensive pattern through performing actions that would bring these tendencies into alignment with the other ostensive pattern. In Figure 1, this ongoing orientation and reorientation is labeled as skillful accomplishment, which refers to the mindful action involved (Pentland & Rueter 1994; Levinthal & Rerup 2006) as professional actors skillfully select when to perform each ostensive pattern (D'Adderio 2014) and, through their reorienting, how to realize the complementarity between the two.

Taken together, these elements of our conceptual framework provide a dynamic view of how complementarity between coexisting ostensive patterns is enabled, whilst minimizing the tendency for one or the other pattern to dominate, or for the two to come into conflict. In doing so, our framework contributes to understanding about the continuously shifting emphasis of ostensive patterns in routine performances (D'Adderio 2014; Feldman & Pentland 2008; Turner & Rindova 2012). We show the role of interdependent routines in providing impulses towards each ostensive pattern and the skillful accomplishment of professional actors in working with and reorienting these impulses in order to attain balance in the moment-by-moment performance of tasks. We thus conceptualize the interjected impulses from interdependent routines and their corresponding reorientations by professional actors as central to coordinating and realizing complementarity between co-existing ostensive patterns. We now discuss the theoretical contributions arising from our conceptual framework.

CONTRIBUTIONS

Our introduction of interdependent routines and their skillful accomplishment into the examination of standardization and flexibility within routine theory makes the following key contributions. First, our study extends existing insights into the tension between competing demands for standardization and flexibility by advancing our understanding of the simultaneous enactment of coexisting ostensive patterns (D'Adderio 2014; Feldman & Pentland 2008; Turner & Rindova 2011). In doing so, it addresses the core tension at the heart of routine theory (Adler et al. 1999; Cohen 2007; Cyert & March 1963; Feldman & Pentland 2003, Nelson & Winter 1982). Specifically, our study elaborates on the *triggers* through which the emphasis on different ostensive patterns shifts. Importantly, our

examination of the shifting salience of interdependent routines shows the dynamic through which different ostensive patterns are foregrounded through the enactment of an intersection. Such intersections orient performances towards one ostensive pattern, while the professional's ability to acknowledge, but also reorient, these emphases towards the other pattern supports the dynamic balancing of the two. Insights about how interdependent routines provide particular orientations that are then reoriented thus further explicates the specific micro-mechanisms through which some performances are foregrounded and others backgrounded (D'Adderio 2014).

Second, our study of interdependent routines contributes to understanding of routine ecologies (Birnholtz et al, 2007) and routine embeddedness (Howard-Grenville, 2005; D'Adderio, 2014). It advances our understanding of the micro-mechanisms that coordinate the dynamic enactment of embeddedness by showing how the overlaps that constitute embeddedness are enacted. Overlaps between routines are not constant, but shift according to the way that interdependence is enacted at specific points of intersection. Some of these intersections may be mandatory, but many are discretionary, enabling either few or multiple iterations, and so, fewer or more overlaps, according to the judgment of the professional. The multiple iterations of intersecting routines according to their shifting salience, which we found, thus address Howard-Grenville's (2005: 634) call to elaborate how overlap between routines stabilizes or shifts within routine embeddedness. In doing so, we contribute to the more dynamic view of context advanced by D'Adderio (2014), by showing how the context in which a routine is embedded is performed as intersections among interdependent routines are enacted. Further, the dynamic enactment of the continuously shifting salience of interdependent routines explicates the coordination of complementarity between multiple routines. It extends our understanding of how the consistency and coherence of a routine ecology are generated (Birnholtz et al, 2007; Galunic & Weeks, 2003) by showing that such complementarity is enacted within the multiple intersections between interdependent routines and a focal routine.

Third, our study further theorizes the role and importance of professional skill in coordinating coexisting ostensive patterns (D'Adderio 2001, 2004; 2014; Howard-Grenville 2005; Leonardi 2011) at their point of intersection with interdependent routines. Following Thompson (1967), we conceptualize the way skilled professionals continuously orient towards the impulses from intersecting routines and reorient towards the other ostensive through his performances as one of reciprocal *task* interdependence.

While Thompson examines reciprocal interdependence at the structural level of coordinating organizational divisions, he notes that this most complex form of interdependence involves intense interaction, within which separate but constituent parts of an organization mutually inform and feed off each other. In our framework, each intersecting routine informs the focal routine, but also amplifies pressures that would skew the routine performance towards one or the other ostensive pattern. To counter-balance such skew, a professional actor reorients this push towards the other ostensive pattern within the performance of the specific task. It is thus the professional, through the dynamic interplay of orientation and reorientation, who generates the intense interaction Thompson (1967) refers to and which balances the two ostensive patterns. In particular, our conceptualization extends studies that examine the reconciliation of competing ostensive patterns at times of disruption (e.g. Turner & Rindova, 2012), and further contributes to our understanding of the dynamic balancing of coexisting ostensive patterns within the selective performances of professional actors as shown by D'Adderio (2014). Reciprocity between ostensive patterns, as they are triggered by interdependent routines, is enacted in the moment and in skilled task performance. This reciprocal interdependence generates a moment of complementarity between coexisting ostensive patterns *within that specific task*, hence reciprocal *task* interdependence. The focal routine unfolds along a series of such moments of reciprocal task interdependence, so contributing to our understanding of how routines are constituted within the unfolding patterning of action (e.g. Feldman 2015; Feldman & Pentland, 2003; Pentland et al. 2012).

Fourth, our study contributes to understanding the role of artifacts in coordinating multiple ostensive patterns (Cohen & Bacdayan 1994; Cohen et al. 1996; Nelson & Winter 1982; D'Adderio 2014; Turner & Rindova 2012). In particular, it advances a performative view of artifacts as they guide and coordinate actors' performances of standardization and flexibility (e.g. D'Adderio 2014; Turner & Rindova 2012). We found that interdependent routines typically intersect with the focal routine through supplementary artifacts that inscribe the knowledge produced within that intersecting routine and make it accessible within the focal routine (Bechky 2003; Carlile 2002). In doing so, we explain how intersects are enacted and amplify pressure towards one or the other ostensive pattern. Furthermore, as professional actors draw upon the knowledge inscribed within these supplementary artifacts and reorient the resultant performances, they log their actions within the core artifact which thereby itself becomes inscribed with knowledge about the dynamic interplay between orientation and reorientation in this performance of the

routine. Supplementary artifacts are thus enabling flexibility by transmitting impulses from interdependent routines, even as the core artifact enables standardization by providing a space within which such impulses are transformed into a consistent output that is recognizable across multiple professionals and performances of a routine. The core artifact is thus disciplining the professional actor and constitutive of the routine (D'Adderio 2008; 2011). Yet, neither core nor supplementary artifacts influence a (re)-orientation towards either standardization or flexibility in isolation from the enactment of a routine intersection. Future research might further explore these relationships between supplementary and core artifacts to extend research into routines as systems of artifacts (Cacciatori, 2012) or sociomaterial ensembles (Pentland et al, 2012), by examining their performative effects on balancing coexisting ostensive patterns (e.g. D'Adderio, 2014).

Our study provides further grounds for future research. The developed framework of interdependent routines provides grounds for further examining the generative nature of routines (Feldman & Pentland, 2003; Parmigiani & Howard-Grenville 2011) and the association between routine stability and change (Feldman 2000; Howard-Grenville 2005; Rerup & Feldman 2011). We show the continuous feedback between coexisting ostensive patterns as reciprocal task interdependence stabilizes a routine, even in the presence of impulses to deviate towards one or the other ostensive pattern. Yet at the same time, the continual amplification of pressures towards one or the other pattern from intersecting routines has generative potential. Specifically, the enactment of each intersection provides the opportunity for a break in, and re-performance of, the sequence of interdependent activities (Feldman & Pentland 2003). Indeed, we found varying re-performance of tasks, including iterative enactment of intersections, in our study. While our routine was marked by stability, both across its multiple performances by a single professional, and its performance across the profession, the nexus between intersecting routines and the focal routine is dynamic and offers the potential for change. Future studies may further explore and theorize the actual process of patterning intersecting routines (Feldman, 2015) and its potential to support either 'feedback loops' (Feldman & Orlikowski 2011: 1242), and routine persistence, or to construct breaks in the routine that enable change (Feldman & Pentland 2003).

Finally, our study provides grounds for further research into the conundrum of how customized professional work can be routinized in a way that retains high autonomy and variation, yet enhances accountability and control (Abbott, 1981; Maister, 1993; Mintzberg, 1979). We show how the enactment

of intersecting routines enables, and is underpinned by, professional skill in drawing upon knowledge from interdependent routines to customize work, even as the routine performance itself disciplines the professional actor to apply judgment in a standardized way that honors accountability to clients and peers. Indeed, the continuous orientation and reorientation we found both enables professional skill but also contains risks for professional deviation towards one extreme; for example, the potential to favor a key client or broker, and so to err towards excessive customization in pricing at the expense of firm profitability. Our focus on professional service *routines* thus provides some insights into how the standardization of skills is constituted as a control mechanism in professional organizations. Routine interdependence both enables, but also disciplines professional skill in ways that constitute the actor as a professional and support the standardization of skills across the profession. Our framework thus provides grounds for future research on the effortful accomplishment of professional routines (Pentland & Rueter 1994), which require a high degree of mindfulness in their performance (Levinthal & Rerup 2006). Specifically, we provide grounds to go beyond prior studies that have considered standardized work to be less mindful (e.g. Nelson & Winter, 1982), and to further the proposition that mindful work may be routinized (Levinthal & Rerup, 2006). We call upon future studies to investigate the professional services context as a means of accessing both mindful routine work and also the disciplining of that mindfulness into standardized tasks and processes.

Boundary conditions. Our study has been conducted in the particular context of appraising reinsurance deals, suggesting some boundary conditions under which our framework will be more applicable. First, our professional routine involves high autonomy and decision making at the point of service delivery. It is therefore comparable with other financial services, consulting, and legal professions with continual demand for flexibility (Empson, 2001; Greenwood et al, 1990). However, it may be less applicable to professions such as engineering or software design and delivery where decision-making is more integrated into systems and teams (Bechky, 2003) and more guided by relatively rigid rules and procedures that need adaptation in the face of variation in the routine (e.g. D'Adderio, 2014; Leonardi, 2011).

Second, with underwriters typically appraising up to 400 deals a year, our context is characterized by high-volume work. Therefore, whilst customization is critical, some form of standardization is also important to make the work process efficient. This contrasts with professions such as law, in which there

are relatively few client relationships (Smets Morris & Greenwood 2012; Bednarek, Burke, Jarzabkowski & Smets forthcoming), but resonates with medical professionals whose routines help to efficiently cope with high patient volumes (Gawande, 2010; Hilligoss & Cohen, 2011; Morgan et al, 2014).

Finally, our study focused on skilled professionals, as all 24 of our participants were experienced underwriters with a full book of business. We thus develop a framework based on those who have become successful representatives of their profession, and so might be expected to display the most skillful accomplishments of customization, but also the greatest sensitivity to pressures for standardization. Less experienced professionals may struggle to find the balance of orienting and reorienting that characterizes our theorizing of reciprocal task interdependence. Other studies might therefore study variation between professional skill levels in performing routines, and might consider professional work in a variety of professional service contexts in order to build upon our framework.

CONCLUSION

Our study has developed a conceptual framework that advances understanding of the dynamic coordination of routine interdependence and its influence on balancing coexisting ostensive patterns. In doing so, it has shed light on the puzzle of routine work within a professional context, "which involves a high degree of customization … [where] little … can be reliably made routine" (Maister 1993: 1). Drawing upon the deal appraisal routine in the reinsurance industry, a financial professional services sector, our study demonstrated the importance of routine interdependence in providing impulses that sustain attention towards different ostensive patterns, even as reciprocal task interdependence balanced these competing patterns and enabled the attainment of complementarity. We suggest that the reciprocity between standardizing and flexibility that we explain is likely to be particularly pertinent in settings that are characterized by highly sophisticated customer demands, and that make continuous variations in routine performance the default position, rather than the exception to the rule (e.g. Turner & Rindova 2012; Szulanski & Jensen 2006; Zbaracki & Bergen 2010). Future studies may draw upon our findings and framework to conduct further research into routines within professional service contexts.

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FIGURE 1: Balancing competing ostensive patterns in the moment

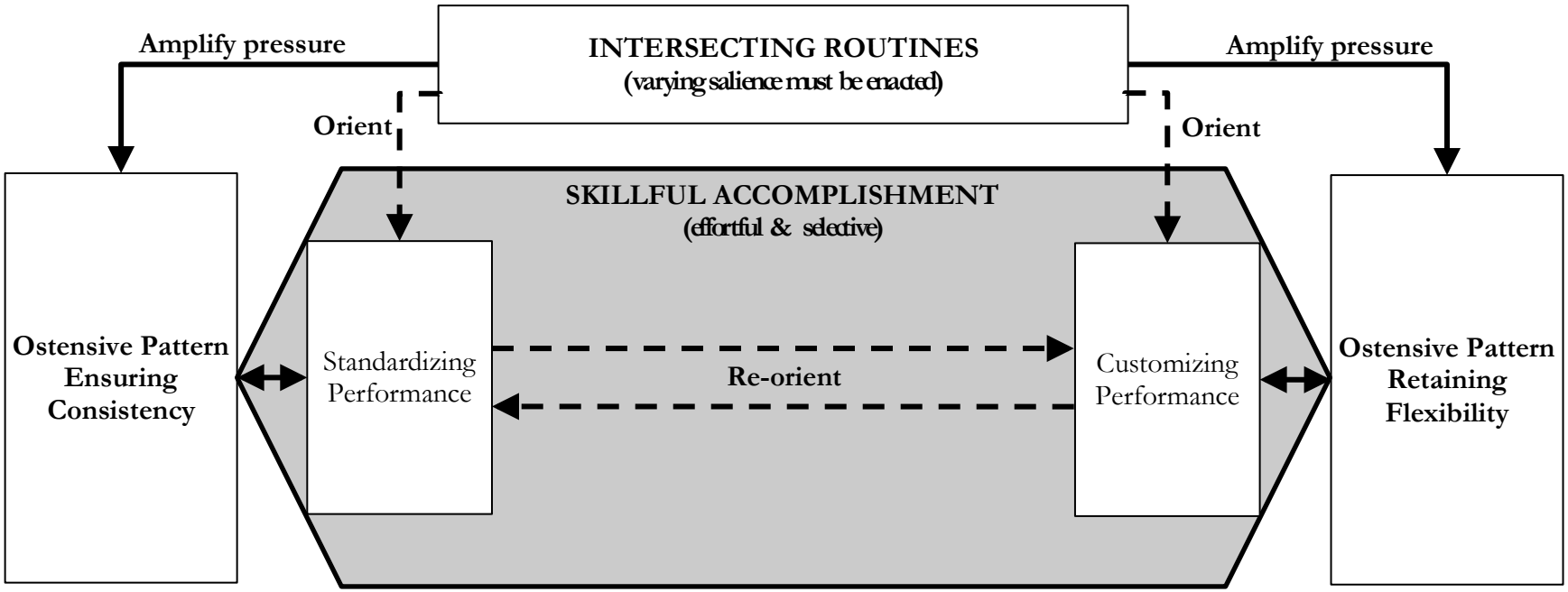

TABLE 1:
A sample of the variation of parameters in any deal

DEAL SPECIFICS	PARAMETER	EXAMPLES OF VARIATION
Type of deal	**Type of event (peril)**	**Earthquake, windstorm, bushfire**
	Territory/state	**Single state (e.g. Florida) or multiple states (e.g. Florida, Texas, Missouri, up to every state)**
Structure	**Layers (excess-of-loss[1])**	**A deal is structured into thresholds ('layers') that distinguish between the severity of likely losses to insured properties[2]. These can be relatively simple 3-4 layer deals or can be 6 or more layers, with different perils included at different layers**
Quantitative information	**Total value of the insured reinsurance policy**	**Deals can range from as little as $1 million to close to $1 billion, depending on how many states and what types of properties they cover.**
	Number of insured properties	**Vast range, according to territory being covered, from a state or region within a state to US nationwide**
	Concentration of insured properties	**Spread of residential and commercial dwellings, indicating the relative to proximity to the peril; e.g. close to coastal shore (e.g. Florida), or earthquake vault line (e.g. California)**
	Structural details of insured properties	**Number of properties made of materials, such as wood, brick, reinforced concrete, then further broken down into different building code compliance details, including features such as shutters, air conditioners, rood straps, length of nails and so forth**
	Types/ values of properties	**Variations according to whether there are high-value homes – in excess of $10 million – through to mobile homes, typically presented in different bands of value**
	Spread of portfolio	**Aggregate overview of policies from commercial and/or residential properties, e.g. commercial only, or a 20% commercial, 80% residential split**
	Information on losses	**Recent losses (typically past 7 years) are included as reinsurers paid claims** **It is rare, but happens that insurance firms stay loss free for several years[3].**
Qualitative information	**Insurer's characteristics**	**Claims adjusting (in-house/outsourced);** **Senior executive's level of experience;** **Risk management strategy;** **Projected growth;** **Longevity of relationship between reinsurer and insurer (e.g., long-term partnership; new deal)** **Perceptions of control over fraud** **Changes in strategy or portfolio** **Rationales provided for losses experienced**

[1] A reinsurer only pays for a loss if the damages to property exceed an agreed threshold which depends on an insurer's capacity to absorb losses.

[2] For instance, a reinsurance deal that has a threshold of $20m (only losses in excess of $20m are covered by the reinsurance deal) may have three bands. The first covers accumulated damages to properties between $20m to $35m, the second band covers accumulated damages to properties between $35m to $60m, and the third band covers accumulated damages to properties between $60m and $100m. A hurricane like Katrina in 2005, may damage that firm's insured values to the extent of $55m USD, meaning that the reinsurer will have to pay claims for losses at the first and second bands, but will keep the premium paid for the third band, because there was no loss at that band. Furthermore, if there is no loss up to the threshold of $20m in any given year, there will be no claim for the reinsurer to pay.

[3] In these instances, insurance firms, typically large national carriers, absorb any losses internally without requiring reinsurer's to pay for damages incurred by policyholders.

TABLE 2: First-order Analysis: Balancing Customizing and Standardizing Performances in the moment

	PERFORMANCE OF FOCAL ROUTINE	REPRESENTATIVE DATA	INTERSECTING ROUTINE
A[6]	*Stage 1: Performing Technical Analysis*		
B	**Scanning cover email** Underwriter (UW) scans the key facts highlighted in the broker's cover email to grasp the deal's level of continuity, change, and required customization.	San Francisco earthquake, homogenous concentration[7] *"He iterates between that information and the 2008 rating sheet for about 2 minutes, making a few handwritten notes on specific figures in the various rating sheets – as an aide memoire as he flits between screens." (Vb. Fn.)*	**Broking Routine** Provides UW with quantitative data and deal specificities.
C	**Repopulating rating sheet** UW copies key parameters from the *submission brochure* into the *rating sheet*. He runs its macros to capture the information consistently, start an audit trail, and enable year-on-year comparison.	Multi-state windstorm, medium-sized national insurer *"He directly copies and pastes across information on the Limit from the [submission] into his own rating sheet. His sheet then populates a lot of the other columns. He also iterates between the '08 and '09 sheets […]. Based on this iteration, he also fills in section of this year's rating sheet." (Vb. Fn.)*	
D	**Providing modeling instructions** Based on the 'highlights' (cover email) and a deeper reading of the submission brochure, the UW instructs his analyst which parameters to use when modeling the raw data to accommodate the specifics of the deal.	Single-state, earthquake, diverse concentration, 50/50 spread *"[Discussing the modeling], they both need to think in some detail about what they put in the model." (Vb. Fn.)* *"Essentially Harry tells me afterwards that […] he wants to make sure that [the modelers] have factored in the right kind of things that he has in mind for this piece of business." (Vb. Fn.)*	**Modeling routine** Provides a numerical view of the deal and the likely occurrence and severity of a loss to the client's portfolio, based on UW instructions and vendor models' generic statistical assumptions.
E	**Transmitting modelable raw data** UW delivers *modelable raw data* to his analyst who feeds them into two vendor models for analysis following the UW's instructions. UW then documents the professional judgments behind his instructions in the *rating sheet*.	Multi-state, flood, diverse concentration, no spread *"I'd rather have a model than no model. Because if you go back […], pricing was a lot more volatile. […] What the models have done is reduced - not eliminated - inconsistency between people. […] And also created greater transparency." (Int.)* *"He then starts writing his 2010 renewal decision notes, looking back at the submission sometimes and then opening Google maps to have a look at the actual island." (VB. Fn.)*	
F	**Reviewing analyst comments** UW reviews the *analyst's comments* to check any anomalies the analyst highlighted and customize his further analysis accordingly once the modeled outputs have been captured in the *rating sheet*.	Multi-state flood, diverse concentration, 90/10 spread *"He then picks up the phone and says to a modeler who has sent him figures that he is looking at the narrative just sent through. […] He wants to know where the figures came from. They are up a lot from his existing narrative." (Vb. Fn.)*	

TABLE 2 CONTINUED

G	**Capturing modeled outputs** UW enters the *modeled output* from both models in his *rating sheet*. He captures a numerical view of the deal's exposure to particular perils, in a way that allows him to subsequently weight, blend and manipulate them in light of qualitative insights.	Single-state windstorm, recent loss, long relationship *"19.40: Tim runs the ratings with and without [parameter] just to deliver a reality check that it is all correct. If the figures stack up to what he'd expect to be the differences in the layers with where the [parameter] kicks in, then it just reassures him." (Vb. Fn.)*	
H	**Customizing model outputs** UW re-visits *maps* to locate insured properties relative to perils and *photos* to enrich his understanding of past losses and their handling. He uses both in conjunction with verbal information from client meetings and structural information from the *submission brochure*. Jointly, they inform his weighting and blending of *modeled outputs* in his *rating sheet* to produce a customized ***technical rate*** that reflects both numerical and qualitative information, as well as past losses and future changes to the deal	Single-state, multi-peril, varied concentration *"[UW] pulls up the state map that shows where the different mutuals have their risks and color codes their market share in those states. […] 'The areas we want penetration in, they're pretty strong in, which is good'." (Vb. Obs.)* *"He is looking at the year on year variation in limits by lava zone in Hawaii from the submission […]. Having established the parameters of the zones, he does some calculations of the limits by zone on his calculator." (Vb. Fn.)* *"The maps are helpful because it is an aggregate cover over zones 1-4, so he wants to determine the relative density of population in the zones, to understand what risk is being aggregated." (Vb. Fn.)*	**Client meeting routine** Offers additional information on a client's processes and/or recent developments which helps the UW contextualize and customize modeled outputs.
I	**Re-performance** When customization produces unexpected or unsatisfactory results, the UW uses his professional judgment to re-perform previous steps of the DAR. i.e., he reaches beyond the re-activation of existing supplementary artifacts and re-engages the intersecting routines that produced them.	Multi-state, multi-peril, 70/30 property spread *"Confronted with unexpected model outputs, [UW] has called the broker to make sense of them: 'Well, if you look at AIR, you get different results. I mean, the TIVs are up, the Residentials are up.' The broker counters: 'But the Residentials are better. So the model is wrong.' He takes out the submission brochure to check the RMS and the AIR PMLs. [UW] then takes his copy, the submission brochure and compares the figures he got from the RMS and AIR to the brochure ones. […] He finds that the written data in the pack does not match the data he was emailed in the excel attachments, so that is something he will want the broker to explain, too […]. He asks for the correct data by tomorrow so he can re-run the models." (Vb. Obs.)*	**Broking Routine** **Modelling Routine**
J	**Calculating a Technical Rate** UW documents the professional judgments behind his customizing in the *rating sheet* and then has its embedded macros calculate a ***technical rate***. This standardized output is recognized by all market participants, facilitates comparisons across years and deals and marks the end of stage 1 of the deal appraisal routine. UW checks that all customizing steps and professional judgments to this point have been documented in his rating sheet notes.	Multi-state, multi-peril, multiple losses, long relationship *"You try and capture the steps that you take to get to the decision and where do you take input from science and where do you ignore it completely because it's wrong? [When that is missing] - as a buyer - you see that in the way people quote. Their numbers jump up all over the place and there's no consistency. And you don't like doing business with those guys." (Int.)* *"UW notes (copied from screen): TP based on the DFLM data provided. Modeled on all model formats. Buying to RMS DLM 1; 846 year event, also attaches at 158 year event – so deemed to be a true top layer. Hence the price. Not surprised to see the loss history on layers 1&2 and no doubt this is the reasons we are being shown this at this late date."(Obs.)*	

TABLE 2 CONTINUED

K	*Stage 2: Performing Weighted Technical Analysis*		
L	**Applying deal-specific 'loadings'** UW revisits *submission pack* and *client meeting file* to remember deal idiosyncrasies (e.g., attempts to contest a claim in court) which customized *modeled outputs* still fail to reflect. Based on this detailed and nuanced understanding of the deal and the client the UW then re-adjusts his loadings in the *rating sheet* to generate a ***weighted technical rate*** that reflects recent losses and generates 'payback' for associated payouts.	Single peril, varied concentration, single loss, short relationship *"Because the projected book is showing a growth of about 300% … [UW] has had to scale up the premium figures presented in the broker pack, in the [company] ratings sheet to reflect the projected income. That is necessary because their premium must reflect the actual book of business that they are writing. Basically, [UW] has just scaled up the whole risk portfolio by a specific factor to achieve a premium that comes up with the projected income. He has not been harsh by loading the more expensive parts of the risk portfolio but just assumed the same distribution as it goes up." (Vb. Fn.)* *"He then took the broker-calculated burning cost and loaded it with a 100 over 65 profit load, which gave him the initial ROL of 15.5 which would pay him 7.5 million. However, he acknowledges that the client may be not happy with this because - with no change in exposure - a move from 5 to 7.5 million pays a 3 million loss very, very quickly." (Vb. Fn.)*	
M	**Re-performance**	Multi-state, multi-peril, large number, large TIV *Broker: "Well, about the orders that we got in, they gave a lot more credit, especially with low figures in T1 and flat in T2 and T3.' [UW] asks how that is reflected in the data. So the broker points out - and pointing to the one-pager that he placed on Chris's keyboard - that the TIVs for 2011 will not include Texas. So Chris said he got fifty-five on line, then he loaded up and [he] explains to the broker how he modeled this. So both Chris and the broker sit pointing to the screen. Chris takes the broker through the modeling and how he came up with the various rates online." (Vb. Obs.)*	**Broking Routine** **Applying deal-specific loadings**
N	**Calculating a Weighted Technical Rate** Once all loadings - and their justifications - are entered in the *rating sheet*, UW re-runs the embedded macros to apply his loadings to the technical rate and calculate the weighted technical rate, marking the end point of stage 2.	Large number, 60/40 spread, recent loss *"I mean even though you've got two models, two different [underwriters] might apply different loading. It might correlate differently with their portfolios, so they feel they can write it for a lot cheaper. You know, so it's not … that's why you get different prices. But it should be converging because the models are all the same basically." (Int.)*	

TABLE 2 CONTINUED

O	*Stage 3: Performing Market Analysis*		
P	**Adjusting for capital scarcity** UW uses the *capacity checker* which records all 'live' deals and how much capital they bind and which 'pot' it is taken from to check the availability of capital for his deal. He compares the bound capacity with the *capital allocation plan* of how much capital to allocate to each geographical area and type of peril. Based on the relative scarcity of capital for this deal, he decides how much of the deal to write and whether to lift or lower the ***weighted technical rate.***	Multi-state, multi-peril, varied concentration, long relationship *"At the top layer, he is writing it for its Texas exposure, as he knows that [deal] has a lot of Texas property in it and he wants to check that against his Texas capacity in the [capacity checker]." (Vb. Fn.).* *"Well, I would like to keep our position because I don't really have much, additional capacity for writing the [region], but if the price is right, we can talk about it." (Vb. Obs.)* *It takes them over capacity in two areas, MidAtlantic and Southeast, but is good in the other 5 territories of the US, so Pete feels that is OK overall. He says this is where judgment comes in and, given that the Return on Exposure - at 55.6% - after factoring in correlating business still looks pretty good 'what that means is we should write this and should not have written some of the other business we wrote in those areas!'"(Vb. Obs.)*	**Business Planning Routine** Provides an annual target 'pot' of capital to allocate to each geographical area and type of peril in order to protect ReCo's capital base against over-exposure to any local peril.
Q	**Accommodating market conditions & profitability** As the UW enters the limits and rates for different layers, the *rating sheet* automatically generates *comparative curves* which illustrate the premium-to-exposure ratio for each layer on each deal. These curves allow the UW to compare profitability across layers and deals and to adjust the ***weighted technical rate*** for this deal to align with others and with broader price fluctuations in the market to generate a ***market rate*** to return to the broker.	Single-state, no spread,no spread, no loss, no relationship *"He compares the Rates on Line to two other programs he has written in similar areas, and finds that this program sits in the middle of them. As he wrote both of them, this is looking like it is going to be a write as well." (Vb. Fn.)* *"Because that's the other thing: Where do you pitch your quote? Where do you want to be? Do you want to be cheap? I mean sometimes that can make sense […]. So it's quite interesting, it's quite tactical. That's where the fun is, you know. Spitting out model prices is dull (laughs) and dangerous!" (Int.)*	**Parallel DAR** Provides UW with a comparative view of the relative attractiveness of different deals and a sense of broader price fluctuations within a market segment.
R	The **market rate** encapsulates the UW's appraisal of the deal in light of other deals and broader market trends, as well as firm-specific capital allocation choices. The UW instantly hands over the market rate to the broker, as it is a necessary input for the continuation of the broking routine, allowing the broker to collect market rates and present them to his client for selection.		**Broking routine** The market rate is the UW's binding offer to cover the deal at the specified rate, which the broker then passes to the client for consideration.

TABLE 3: Coordinating Interdependent Routines and Coexisting Ostensive Patterns around Standardizing and Customizing[8]

Intersecting Routines	Intersect, Pressure and Orientating Impulse of Intersecting Routine	UW Re-orientation in response to Intersecting Routine	Performance of Professionalism
Broking routine Provides underwriters (UWs) with quantitative data and background information to form the basis of their deal appraisal.	Intersect: Mandatory Amplifies pressure for: **Retaining flexibility** Impulse orients DAR to: C**ustomizing** Receiving the full variety of data and details specific to the deal, prompts the UW to customize his analysis and pricing. He starts by scanning the cover e-mail to get a high-level understanding of key facts, structures and year-on-year changes.	UW reorients DAR to: **Standardizing** To reduce variation in the data provided, the UW filters pertinent information from the submission brochure and enters key data into pre-specified cells in the rating sheet, casting his customization into a standardized format and start an audit trail for this specific deal.	**Responsiveness & Accountability** Data sharing between UW, broker and client is the bedrock of service co-creation in reinsurance. Recognizing both, the need for customization and for disciplined underwriting, the dual accountability to clients and to their firm's profitability with that client underpins UWs' professionalism and status.
Modeling routine Provides a numerical view of the deal, modeling raw data according to UW instructions in order to calculate the likely occurrence and severity of a loss to the client's portfolio, based on vendor models' statistical assumptions.	Intersect: Mandatory Amplifies pressure for: **Ensuring consistency** Impulse orients DAR to: **Standardizing** The UW hands over the modelable raw data to a modeler to transform it into a standardized numerical view of the deal and captures any customization in his underwriter notes. The returned numerical data is then entered into pre-specified cells in his rating sheet to capture modeled data as a standard, numerical view of the deal	UW reorients DAR to: C**ustomizing** Together with the modelable raw data, the UW passes modeling instructions on how to customize selected parameters of the standard model to account for his personal reading of the deal. When getting modeled outputs back, he notes modeler comments for further customization, which may prompt a re-performance of the modeling routine.	**Personal Expertise & Quality of Craft** Skillful blending of personal judgment and standardized analysis earns UWs respect and trust from clients, peers and management. The confines of standard models discipline customizing, facilitate professional peer review by exposing the UW's tailored use of models, and protect UWs from poor reputations as wayward 'mavericks' or rule-bound 'sticklers'.

[8] Table 3 is a schematic of the intersecting routines to illustrate how they amplify pressure and provide impulses to the focal routine. It does not faithfully reproduce each iteration of an intersection within a routine, as most intersection can and will be performed multiple times throughout the routine. For a more detailed explanation of each stage of the routine, see Table 2.

Client meeting routine Offers additional information on a client's processes and/or recent developments which helps the UW contextualize and further analyze modeled outputs.	Intersect: Discretionary Amplifies pressure for: **Retaining flexibility** Impulse orients DAR to: **Customizing** Clients share maps, photos and presentation handouts to locate insured properties relative to perils and enrich the UW's understanding of past losses, expecting him to reflect their additional information sharing in his pricing. In conjunction with his personal notes, these give the UW a richer and more current account of deal specifics and client quality, prompting further customizing of existing modeled outputs.	UW reorients DAR to: **Standardizing** The UW accounts for additional deal specifics, such as its layer structure, by weighting and blending modeled outputs. He does so through the macros in his rating sheet so as to produce a customized *technical rate* for each layer that reflects both past losses and future changes to the deal, but is still recognized as a standardized, easily comparable numerical value. He then enters personal notes on his customizing steps in the rating sheet to facilitate peer review, comparison and personal consistency.	**Client service & Collegiality** Giving clients a sense of 'being heard' and taking into account their present situation, rather than only their past losses, is critical for adequate pricing and also long-term relationship management. Casting such responsiveness in the standards of the profession simultaneously signals commitment to the underwriting profession and transparency in the price-making process.
Broking routine As above	Intersect: Discretionary Amplifies pressure for: **Retaining flexibility** Impulse orients DAR to: **Customizing** As and when necessary, the UW can reach out to the broker for more information or revisit the submission brochure and cover email to further contextualize modeled outputs and personal notes to produce a tailored rate that reflects recent losses and generates 'payback' for associated payouts.	UW reorients DAR to: **Standardizing** This contextual understanding is reflected in 'loadings' that the UW uses to weight and adjust the *technical rate* in his rating sheet. By recording 'loadings' separately in the rating sheet, both standard outputs and their customization are captured in a standardized, easily comparable format.	**Personal Expertise & Accountability** Displays of personal experience and professional judgment during customizing demonstrate UWs' personal mastery of the field and build their personal status in the profession.

Client meeting routine As above	Intersect: Discretionary Amplifies pressure for: **Retaining flexibility** Impulse orients DAR to: **Customizing** As and when necessary, the UW revisits personal notes and photos to remember and reflect deal idiosyncracies (e.g., attempts to contest a claim in court) which modeled outputs by themselves fail to reflect. Together with the UW professional expertise, profit expectations and the firm's overheads, these detailed and nuanced understandings of deal, client, and firm inform how the UW then re-adjusts his loadings.	UW reorients DAR to: **Standardizing** On the one hand, these re-adjustments ensure consistency in the overhead and profit margin loadings charged to each client. On the other, they reflect deal specifics in a more tailored reflect. Irrespective of that, all loadings are recorded in pre-specified cells of the rating sheet to capture a more customized, *weighted technical rate* in a highly standardized way.	**Collegiality & Consistency** Allowing peers and especially colleagues re-trace customizing steps later in the season or in the next year when the deal comes up for renewal again, engenders the sense of collegiality that characterizes professional services and especially fosters consistency across deals and across years, which is critical for maintaining professional credibility.
Business Planning Routine Provides an annual target 'pot' of capital to allocate to each geographical area and type of peril in order to protect ReCo's capital base against over-exposure to any local peril.	Intersect: Mandatory Amplifies pressure for: **Ensuring consistency** Impulse orients DAR to: **Standardizing** To maintain good underwriting discipline and achieve a consistent degree of risk spreading, ReCo mandates all UWs to check their underwriting against the company's capital allocation plan using the capacity checker to see how much capital is left in the target 'pot' for their specific deal..	UW reorients DAR to: **Customizing** Based on information from the capacity checker, the UW tailors his pricing to the relative scarcity of capital in the target 'pot'. He decides how much of the deal to write and whether to lift or lower the *weighted technical rate* and documents his thoughts in the UW notes field in the rating sheet.	**Prudence & Collegiality** Trading on behalf of their company, UWs must demonstrate that they price prudently, but also do not put their personal business relationships and interests above those of their company and the other members of the Lloyd's community.

Parallel DAR Provides UW with a comparative view of the relative attractiveness of different deals and a sense of broader market price fluctuations within a segment.	Intersect: Discretionary Amplifies pressure for: **Ensuring consistency** Impulse orients DAR to: **Standardizing** In order to generate a *market rate***,** the collectively recognized, ostensive end product of the DAR, the UW uses comparative curves to benchmark the risk-return of his own deals and those of his colleagues compare profitability across layers and deals.	UW reorients DAR to: **Customizing** Where risk-return ratios diverge, the UW adjusts the *weighted technical rate* for this deal so as to reflect broader market fluctuations and ensure his market rates align with others.	**Consistency & Judgement** The UW demonstrates his understanding of broader market dynamics and his ability to contextualize the deal within them. It is the ability to marry the two that equally demonstrates the judgement valued by the client and the consistency valued by management.
Broking routine The UW transmits the *market rate* to the broker so he can share it for consideration with the client.	Intersect: Mandatory Amplifies pressure for: **Ensuring consistency** Impulse orients DAR to: **Standardizing** Transmitting the *market rate* to the broker marks the end point of the DAR and the expectation is that rates are communicated in a highly standardizes format to facilitate collection, comparison and consideration by the client.	UW reorients DAR to: **Customizing** UWs may choose to complement their standardized transmission with personal notes to the broker, either to remind them of the favorable customizations they have accomplished for the sake of the client or to end negotiations on a personal and friendly note for the sake of future deals.	**Responsiveness & Client Service** The UW displays how he has responded to client demands and deal specifics and may outline corporate restraints and risk management considerations that may have constrained further customizing in the interest of disciplined underwriting.

APPENDIX A

ROUTINE	PURPOSE AND DESCRIPTION	ACTIVITIES AND ARTIFACTS
Broking routine	Broker facilitates access to ensure client's insured exposure is fully covered at appropriate rate/price. Broker structures a client's deal and liaises with underwriters during the appraisal, including relaying the quotes to clients.	Activities: Advise client on deal structure; compile information on a deal and create a submission brochure; distribute a deal's information to underwriters from multiple reinsurers; liaise with underwriters on remaining questions on a deal; collect market rates from underwriters and submit to client. Artifacts[9]: Cover e-mail; submission brochure; modelable raw data (insurer's exposure information) as part of in submission pack
Client meeting routine	Outside of the appraisal period, underwriters meet directly with clients to get up-dates on the client portfolio, e.g. recent losses, achievement of projected exposure management, future strategy, as part of evaluating the ongoing viability of the relationship.	Activities: Meet representative of client, typically the Chief Risk Officer or Managing Director at industry conferences, on site visit, or roadshow; receive updates on claims, losses, future expansion and risk exposure management strategies. Underwriters share information on availability of capital for client's deal in the future. Artifacts: Client's presentation handout; maps; photos; underwriter's personal notes
Modeling routine	To ensure a reinsurer's internal risk management, the accumulation and spread of every deal's statistical probability of losses based on multiple scenarios is recorded and monitored.	Activities: Feed modeled raw data into reinsurer's internal data repository; run deal on basis of industry-standard models and in-house models; tweak assumption about a risk; create scenarios for each model; interpret scenarios; assess probable maximum loss for scenarios. Artifacts: Analyst's commentary; modeled output (in analyst's transmission)
Business planning routine	To achieve a reinsurer's strategic plan for growth and capital returns and avoid over exposure, capital allocation targets for each region and risk type are set, and each capital allocation decision on a deal is recorded and monitored.	Activities: Set targets for rate of return; manage diversification across a portfolio of deals; allocate capital to different regions and types of risk; systematic updating of available capital, financial risk management to avoid depletion of capital. Artifacts: Capital allocation plan; 'capacity checker'

[9] The artifacts arise from intersecting routines, hence, we termed these routine-specific artifacts.